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NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

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Date of mailing (day/month/year) 26 July 2000 (26.07.00)	
International application No. PCT/EP99/09439	Applicant's or agent's file reference 8L02PC
International filing date (day/month/year) 03 December 1999 (03.12.99)	Priority date (day/month/year) 04 December 1998 (04.12.98)
Applicant GARCIA-MARTIN, Miguel-Angel et al	

1. The designated Office is hereby notified of its election made:

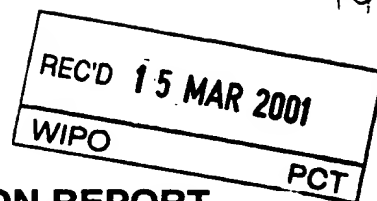
☒ in the demand filed with the International Preliminary Examining Authority on:

21 June 2000 (21.06.00)

☐ in a notice effecting later election filed with the International Bureau on:2. The election ☒ was☐ was not

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 8L02PC	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/EP99/09439	International filing date (day/month/year) 03/12/1999	Priority date (day/month/year) 04/12/1998
International Patent Classification (IPC) or national classification and IPC H04Q3/00		
Applicant TELEFONAKTIEBOLAGET L M ERICSSON (PUBL) et al.		



- This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
- This REPORT consists of a total of 5 sheets, including this cover sheet.

☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of sheets.

- This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☒ Certain documents cited
- VII ☒ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 21/06/2000	Date of completion of this report 09.03.2001
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Schweitzer, J-C Telephone No. +49 89 2399 8963 

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/EP99/09439

I. Basis of the report

1. This report has been drawn on the basis of *(substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments (Rules 70.16 and 70.17).)*

Description, pages:

1-8 as originally filed

Claims, No.:

1-11 as originally filed

Drawings, sheets:

1/4-4/4 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/EP99/09439

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims 1 - 11
	No: Claims
Inventive step (IS)	Yes: Claims 1 - 11
	No: Claims
Industrial applicability (IA)	Yes: Claims 1 - 11
	No: Claims

2. Citations and explanations
see separate sheet

VI. Certain documents cited

1. Certain published documents (Rule 70.10)

and / or

2. Non-written disclosures (Rule 70.9)

see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
see separate sheet

Concerning section V.2 (reasoned statement under Article 35(2) PCT)

Claim 1 relates to a method for transmitting signalling information in a telecommunications network between peer user/application parts.

Prior art: In telecommunication systems signalling information is normally transmitted on dedicated signalling channels, in particular SS7 channels. In conventional SS7 systems, the protocol stack called MTP level 3 handles the routing of signalling messages between neighbouring signalling links based upon information received from higher SS7 levels concerning the final destination of a signalling message. To reduce the complexity of signalling networks, IP transport mechanism have been introduced at higher levels in the SS7 protocol stacks, see e.g. the cited reference **WO-A-97/42774 (Ericsson)**, wherein IP operation and maintenance message signals are encapsulated within a SCCP message and assigned an appropriate SS7 address.

Problem: In this prior art proposal, each application or user part requires individual IP address mapping/translation tables.

Invention: In the claimed method, by contrast, parts of the MPT levels 1 and 2 are replaced by an IP based protocol level and all user/application parts sharing a common MTP level 3 also share a common table mapping destination signalling point identifiers to IP addresses and ports. Thus, changes in IP routing information need be reflected only in a single common table.

Such a method as claimed is neither taught, nor rendered obvious, alone or in combination, by the prior art documents cited in the International Search Report. Claim 1 is therefore novel and considered to involve the required inventive step, Articles 33(2) and (3) PCT. The subject-matter of claim 1 is also industrially applicable.

The same applies to independent **claim 11**, which is drafted in structural terms and corresponds essentially to method claim 1. Claim 11, therefore, equally meets all the requirements of Article 33 PCT.

Dependent **claims 2 to 10** relate to further implementing details of the method defined by claim 1 to which they refer and are thus equally novel, inventive and industrially applicable.

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/EP99/09439

Concerning section VI (certain documents cited)

The priority document of the application was not available at the time of establishment of this report. The present report is thus based on the assumption that all claims enjoy priority rights from the filing date of the priority document. If it turns out that this is not correct, the document **WO-A-99/23124** (publication date: 10.06.99; filing date: 27.11.98; priority date: 01.12.97) cited in the international search report could become relevant.

In addition, said document could possibly be considered in the regional/national examination phase, especially for assessing novelty.

Concerning section VII (form and contents).

In order to meet the requirements of Rule 5.1.(a),(ii) PCT, the relevant prior art document **WO-A-97/42774 (Ericsson)** noted above should be acknowledged by reference and briefly discussed in the introductory part of the description.



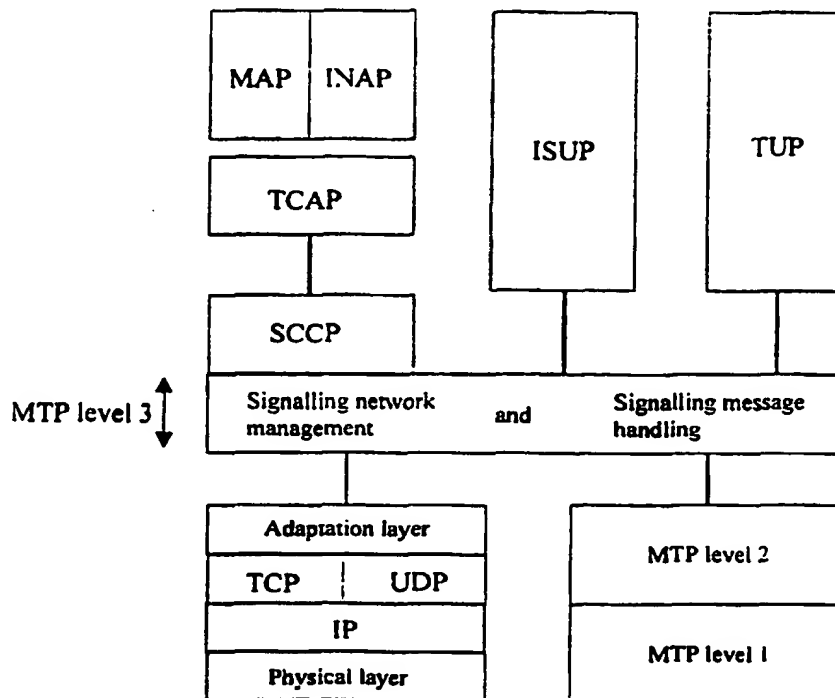
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁷ : H04Q 3/00		A1	(11) International Publication Number: WO 00/35205
			(43) International Publication Date: 15 June 2000 (15.06.00)
(21) International Application Number: PCT/EP99/09439 (22) International Filing Date: 3 December 1999 (03.12.99) (30) Priority Data: 982620 4 December 1998 (04.12.98) FI (71) Applicant (for all designated States except US): TELEFON-AKTIEBOLAGET LM ERICSSON (publ) [SE/SE]; S-126 25 Stockholm (SE). (72) Inventors; and (75) Inventors/Applicants (for US only): GARCIA-MARTIN, Miguel-Angel [ES/ES]; Pase esperanza 8, esc. 3, 7-B, E-28005 Madrid (ES). GARCIA GONZALES, Juan, María [ES/ES]; Banos de Montemayor 6, 1 B, E-28005 Madrid (ES). (74) Agent: BORENIUS & CO OY AB; Kansakoulukuja 3, FIN-00100 Helsinki (FI).		(81) Designated States: AE, AL, AM, AT, AT (Utility model), AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, CZ (Utility model), DE, DE (Utility model), DK, DK (Utility model), DM, EE, EE (Utility model), ES, FI, FI (Utility model), GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SK (Utility model), SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>	

(54) Title: SIGNALLING MESSAGE TRANSPORT MECHANISM

(57) Abstract

A method of transmitting signalling information in a telecommunications network between peer user/application parts. Signalling information is transferred from a first user/application part to a Message Transfer Part (MTP) level 3, the information including a destination signalling point identifier identifying the signalling point at which the peer user/application part is located. The MTP level 3 determines from the destination signalling point identifier, a destination address suitable for conveying the signalling information to the destination signalling point. In the event that the destination address is an Internet Protocol (IP) address and port number, the signalling information and the determined IP address and port number are transferred to an IP part for transmission over an IP network to the destination signalling point.



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Signalling Message Transport Mechanism

Field of the Invention

5 The present invention relates to a transport mechanism for signalling messages in a communications network and more particularly, though not necessarily, to a transport mechanism for signalling messages which are traditionally carried by a Signalling System No.7 based network.

10 Background to the Invention

In a telecommunications system, signalling equipment and signalling channels are required for the exchange of information between system nodes. In particular, this internode signalling informs traffic channel switches of what is to be performed when a
15 telephone or data call is to be set up or released in so-called "circuit-switched" connections. Signalling is also used to query centrally located databases, e.g. to obtain routing information for 800 numbers and to determine the location of a subscriber in a Public Land Mobile Network (PLMN).

20 Modern telecommunications systems now largely make use of Common Channel Signalling (CCS) whereby signalling information is transmitted on one or more dedicated signalling channels, distinct from the channels used to carry actual user information (e.g. voice or data). An important feature of CCS is that the same signalling system may support services in a variety of existing telecommunications protocols, e.g. Public
25 Switched Telephone Network (PSTN), Integrated Services Digital Network (ISDN), and Public Land Mobile Networks (PLMN), as well as proposed future protocols such as B-ISDN, enhancing greatly the interoperability of networks supporting different protocols.

Currently, the predominant CCS is known as Signalling System Number 7 (SS7), defined
30 in the ITU-T (International Telecommunications Union - Telecommunications section) recommendations starting with Q.700, and by ANSI (American National Standards Institute) in recommendations T1.111. SS7 is a packet switched system having multiple signalling links of one time slot in a Time Division Multiple Access (TDMA) E.1 or T.1 transmission format (the other time slots being available for user data). Individual
35 signalling message packets (datagrams) are associated with respective individual telephone calls. As only a relatively small amount of signalling information is associated with a single telephone call, a single SS7 channel is able to handle all signalling between two network nodes (termed "signalling points") for several thousands of calls.

As already alluded to above, SS7 is able to provide a signalling message transport mechanism for a number of different applications. Figure 1 illustrates an SS7 protocol stack of which the lowest level, Message Transfer Part (MTP) level 1, defines the physical, electrical, and functional characteristics of a digital signalling link. MTP level 1 has a number of different possible forms including the European standard E.1 (2048 kb/s and 32 64 kb/s channels). MTP level 2 takes care of the accurate end-to-end transmission of messages across a chosen signalling link, whilst MTP level 3 handles the routing of signalling messages between neighbouring signalling links based upon information received from higher SS7 levels concerning the final destination of a signalling message. MTP level 3 handles *inter alia* re-routing of messages away from failed or congested signalling links.

Above the MTP levels, SS7 comprises an ISDN User Part (ISUP) which defines the protocol and procedures involved in setting-up, controlling, and tearing-down circuit switched connections which carry voice and data over the Public Switched Telephone Network (PSTN). ISUP is not only used in ISDN networks, but is also employed in non-ISDN networks. A Telephone User Part (TUP) supports basic call processing for analogue calls and is used for example in China.

With the development of advanced network functions such as freephone (800 numbers), call forwarding, mobile roaming, etc, it has been necessary to add to SS7 a number of additional levels to support these functions. In particular, SS7 is now provided with a Signalling Connection Control Part (SCCP) which handles the routing of signalling messages to and from the numerous applications which use the SS7 transport mechanism. SCCP also provides for the transformation of a Global Title (e.g. a dialled 800 number) into a destination signalling point (in Europe a signalling point is defined by a combination of a Network Indicator and a Signalling Point Code).

Located above the SCCP is a Transaction Capabilities Application Part (TCAP) which is a protocol for dealing with the exchange of information between signalling points related to database queries. For example, a switch within a network may use TCAP to determine the B-number associated with a dialled 800 number. This may require the sending of a suitable TCAP message to a database associated with the 800 number, with the SCCP performing the identification of signalling point at which the database is located.

The applications which make use of TCAP, and by extension SCCP, are many. For example the Mobile Application Part (MAP) is used in PLMNs to transfer information

between Mobile Switching Centres (MSCs), Home Location Registers (HLRs), and Visitor Location Registers (VLRs), whilst the Intelligent Network Application Part (INAP) is used to transfer information between intelligent network nodes and telephone switches.

5 It will be appreciated that SS7 has evolved into a complex and hence computationally intensive set of protocols. There therefore exists a desire to both reduce this complexity and also to reduce the high costs of signalling networks (both in terms of infrastructure and of maintenance). Telecommunications network designers have turned for an answer
10 to the field of data networks and in particular to Internet Protocol (IP) networks where high demand has lead to relatively low cost and technically advanced solutions.

Several proposals have been put forward to employ IP networks in telecommunications signalling. For example, it has been proposed to encapsulate TCAP messages into IP
15 datagrams for transmission over an IP network, with a mapping being made between Global Titles (and/or destination signalling points) and IP addresses for the purpose of routing the datagrams.

Summary of the Present Invention

20 It has been recognised by the inventors of the present invention, that whilst the introduction of IP transport mechanisms at higher levels in the SS7 protocol stack, e.g. directly beneath the TCAP, results in certain advantages, it results in a piecemeal solution where each application or user part, or at least small groupings of application and user
25 parts, require individual IP address mapping tables. In the case of TCAP over IP (or SCCP over IP), non-TCAP (or SCCP) users such as ISUP and TUP do not have access to the IP network.

30 It is an object of the present invention to overcome or at least mitigate the above noted disadvantage. This and other objects are achieved at least in part by replacing MTP level 2 with the IP based protocol levels.

According to a first aspect of the present invention there is provided a method of transmitting signalling information in a telecommunications network between peer
35 user/application parts, the method comprising:

transferring signalling information from a first user/application part to a Message Transfer Part (MTP) level 3, the information including a destination signalling point identifier identifying the signalling point at which the peer user/application part is located:

determining at the MTP level 3, from said destination signalling point identifier, a destination address suitable for conveying the signalling information to the destination signalling point or to an intermediate signalling point *en route* to the destination signalling point; and

5 in the event that said destination address is an Internet Protocol (IP) address and port number, transferring the signalling information and the determined IP address and port number to an IP part for transmission over an IP network to the destination or intermediate signalling point.

10 Embodiments of the present invention enable all user/application parts sharing a common MTP level 3 (e.g. ISUP, TUP, TCAP/SCCP, etc) to also share a common table mapping destination signalling point identifiers to IP addresses and port numbers. Thus, changes in IP routing information (and/or destination signalling point changes) need be reflected only in the single common table, and there is no need to update multiple translation tables.

15 Preferably, the method of the present invention comprises:

receiving the signalling information transmitted over the IP network at the signalling point identified by said IP address and port number; and

20 passing the signalling information to an MTP level 3 and determining whether or not the signalling point is the destination signalling point on the basis of said destination signalling point identifier included in the signalling information.

25 Preferably, the method comprises transferring the signalling information to an MTP level 2 in the event that the destination address determined by the MTP level 3 is a signalling link, and transmitting the information to the destination signalling point, or to an intermediate signalling point, over the signalling link.

30 In the event that the receiving signalling point is the destination signalling point, the signalling information is passed to the peer user/application part. If the receiving signalling point is not the destination signalling point, then the MTP level 3 determines a further destination address, on the basis of the destination signalling point identifier, suitable for conveying the signalling information to the destination signalling point or to another intermediate signalling point. The signalling data may be transmitted to the destination signalling point, or to the next intermediate signalling point, via an IP network
35 as already described or over an alternative network such as an SS7 network (MTP level 2).

Preferably, the method comprises providing a look-up table at the originating signalling point which maps signalling point identifiers to IP addresses and port numbers or to signalling links.

- 5 Preferably, the method comprises providing an adaptation level between the MTP level 3 and the IP part, at the originating, intermediate, and destination signalling points. The adaptation layer "listens" to a predetermined port number to receive and process incoming TCP connections or UDP packets, and provides an interface between the MTP level 3 and the TCP/UDP levels.

10

The signalling point identifier may comprise a Network Indicator (NI) and a Signalling Point Code (SPC), where the NI identifies a network and the SPC identifies a signalling point within that network. Alternatively, the signalling point identifier may have a Network Indicator plus "Network Identifier - Network Cluster - Network Cluster Member" format (according to the US standard) or some other such format.

15

According to a second aspect of the present invention there is provided apparatus for transmitting signalling information in a telecommunications network between peer user/application parts, the apparatus comprising:

20

first processing means implementing a Message Transfer Part (MTP) level 3 for receiving signalling information from a first user/application part, the information including a destination signalling point identifier identifying the signalling point at which the peer user/application part is located, the MTP level 3 determining from said destination signalling point identifier, a destination address suitable for conveying the signalling information to the destination signalling point or to an intermediate signalling point *en route* to the destination signalling point; and

25

second processing means implementing an IP part for transmitting the signalling information and the determined IP address and port number over an IP network to the destination or intermediate signalling point,

30

in the event that said destination address is an IP address and port number.

Brief Description of the Drawings

For a better understanding of the present invention and in order to show how the same may be carried into effect reference will now be made, by way of example, to the accompanying drawings, in which:

35

Figure 1 shows schematically the protocol levels in an SS7 protocol stack;

Figure 2 shows schematically a telecommunications network;

Figure 3 shows schematically the protocol levels in an IP based signalling information transport mechanism;

Figure 4A is a flow diagram illustrating the process of transmitting signalling messages from a signalling point of the network of Figure 2; and

5 Figure 4B is a flow diagram illustrating the process of receiving signalling messages at a signalling point of the network of Figure 2.

Detailed Description of Certain Embodiments

10 A conventional SS7 protocol stack has already been described with reference to Figure 1. An alternative to this SS7 transport mechanism will now be described, firstly with reference to Figure 2 which shows schematically a telecommunications network.

15 The telecommunications network comprises a first signalling point 1 which, for the purpose of the present example, is a Mobile Switching Centre (MSC) of a PLMN. A second switching point 2 of the PLMN is a Visitor Location Register which maintains a record of mobile subscribers registered with the MSC 1, their status (i.e. on or off), and their current location (i.e. cell). In the event that a call is initiated to a subscriber for whom the MSC 1 is the "home" exchange, before the call can be set up it is necessary for
20 the MSC 1 to exchange certain signalling information with the VLR 2. The form of this information will not be described here in detail, other than to note that it is the Message Application Parts (MAPs) at the MSC 1 and VLR 1 which are the users of the exchanged information, with the MAPs communicating via respective TCAPs and SCCPs.

25 As will be described below, MAP messages are transported between the MSC 1 and the VLR 2 using an IP network indicated generally by reference numeral 3 in Figure 2. The IP network may comprise a number of Ethernet links or the like, with intermediate IP routers. In addition to the MSC 1 and the VLR 2, other signalling points may be connected to the same IP network 3 although these are not shown in the Figure.

30 The role of the MTP level 3 in selecting a signalling link for signalling information in an SS7 network has been described above as being to select a signalling link on the basis of routing information received, in the case of MAP messages, from the SCCP. In Europe, this routing information is typically a signalling point identifier comprising a Network Indicator (NI), a destination Signalling Point Code (SPC), and a Signalling Link Selection (SLS). The MTP level 3 makes use of a look-up (or routing) table to perform the mapping
35 between the signalling point identifiers and signalling links. The look-up table is illustrated in Figure 2 by a database 4.

For the purposes of transporting signalling information via the available IP network 3, the look-up table used by the MTP level 3 is modified to replace signalling links with IP addresses and port numbers, where respective signalling points are connected to the IP network 3. When an IP address and port number are available for a destination signalling point, the MTP level 3 routes the signalling information (plus address) to a set of protocol levels which effectively replace the MTP levels 1 and 2 of the conventional SS7 protocol stack.

These replacement levels include a TCP/UDP layer which is responsible for the encapsulation of the signalling information into datagrams and for ensuring the error free transmission and of the datagrams. Encapsulated datagrams are then passed to an IP level which is responsible for routing the datagrams over the IP network 3 on the basis of the associated IP addresses and port numbers. Beneath the IP level is the physical level which may be Ethernet, X.25, or the like.

An adaptation level is disposed between the MTP level 3 and the TCP/UDP levels and acts as an interface for sending MTP messages to the TCP/UDP level and *vice versa*. The adaptation layer also listens to a predefined port number to receive and process incoming TCP connections and UDP packets, as well as monitoring the availability of MTP 3 levels at remote signalling points. In the event that an event occurs in the IP network (e.g. the route to a remote signalling point goes down, the TCP connection is dropped, or a new TCP connection has been received), this is signalled to the MTP 3 level by the adaptation layer.

Upon arrival at the signalling point associated with the IP address, i.e. VLR 2, the signalling messages are decapsulated by the TCP or UDP level and are passed to an adaptation layer which is assigned the port number conveyed with the received signalling messages. The adaptation layer passes the messages to an MTP level 3, which confirms that the receiving signalling point is indeed the destination for the messages on the basis of the destination signalling point identifier which accompanies the message. The MTP level 3 then passes the messages to the peer MAP/TCAP via the SCCP level.

In some cases, a destination signalling point for a signalling message may not be connected to the IP network 3, such that it is necessary to route signalling messages via an intermediate signalling point. This is illustrated in Figure 2, where signalling point 2 is now considered as an intermediate signalling point whilst signalling point 5 is the destination signalling point.

In this case, the IP address and port number returned by the database 4 at the MSC 1 identify the intermediate signalling point 2. Upon receipt of a message at the intermediate signalling point 2, the message is decapsulated at the TCP or UDP level and is passed to the MTP level 3 via the adaptation layer. From the destination signalling point identifier contained in the message, the MTP level 3 determines that the intermediate signalling point 2 is not the destination signalling point and accordingly selects a destination address appropriate to the actual destination signalling point 5, using a database 4 associated with the receiving signalling point 2.

Assuming that a second IP network 6 connects the intermediate signalling point 2 to the actual destination signalling point 5, then the database query returns an IP address and port number associated with the destination signalling point 5.

It may alternatively be the case that a destination/intermediate signalling point is not connected to the originating signalling point via the IP network 3 (either directly or indirectly via an intermediate signalling point), but rather by a conventional SS7 network. In this case, when the MTP level 3 at the originating signalling point queries the database 4 with the destination signalling point identifier, a signalling link is returned (rather than an IP address and port number). The MTP level 3 then directs the signalling information to the MTP level 2 (illustrated in Figure 3), for transport over the SS7 network. Similarly, an intermediate signalling point may have the option of directing signalling information over an IP network or an SS7 network, depending upon availability.

Figure 4A is a flow diagram illustrating the process of transmitting a signalling message over an IP network to a signalling point, whilst the flow diagram of Figure 4B illustrates the process of receiving a signalling message at a signalling point.

It will be appreciated by the person of skill in the art that various modifications may be made to the above described embodiment without departing from the scope of the present invention. For example, whilst the above description has been concerned with the transmission of MAP messages, the invention is also applicable to the transmission of other signalling messages which make use the MTP level 3, e.g. ISUP, TUP, etc.

Claims

1. A method of transmitting signalling information in a telecommunications network between peer user/application parts, the method comprising:
 - 5 transferring signalling information from a first user/application part to a Message Transfer Part (MTP) level 3, the information including a destination signalling point identifier identifying the signalling point at which the peer user/application part is located;
 - determining at the MTP level 3, from said destination signalling point
10 identifier, a destination address suitable for conveying the signalling information to the destination signalling point or to an intermediate signalling point *en route* to the destination signalling point; and
 - in the event that said destination address is an Internet Protocol (IP) address and port number, transferring the signalling information and the determined IP
15 address and port number to an IP part for transmission over an IP network to the destination or intermediate signalling point.
2. A method according to claim 1 and comprising transferring the signalling information to an MTP level 2 in the event that the destination address determined
20 by the MTP level 3 is a signalling link, and transmitting the information to the destination signalling point, or to an intermediate signalling point, over the signalling link.
3. A method according to claim 1 or 2 and comprising:
 - 25 receiving the signalling information transmitted over the IP network at the signalling point identified by said IP address and port number; and
 - passing the signalling information to an MTP level 3 and determining whether or not the signalling point is the destination signalling point on the basis of said destination signalling point identifier included in the signalling information.
30
4. A method according to claim 3 and comprising passing the signalling information to the peer user/application part in the event that the receiving signalling point is the destination signalling point.
- 35 5. A method according to claim 3 and comprising determining at the MTP level 3 a further destination address, on the basis of the destination signalling point identifier, suitable for conveying the signalling information to the destination

signalling point or to another intermediate signalling point. if the receiving signalling point is not the destination signalling point.

- 5 6. A method according to any one of the preceding claims and comprising providing a look-up table at a transmitting signalling point. which table maps signalling point identifiers to IP addresses and port numbers or to signalling links.
- 10 7. A method according to any one of the preceding claims and comprising providing an adaptation level between the MTP level 3 and the IP part at the originating signalling point, as well as at intermediate and destination signalling points, the adaptation layer listening to a predetermined port number to receive and process incoming TCP connections or UDP packets and providing an interface between the MTP level 3 and TCP/UDP levels.
- 15 8. A method according to claim 7, wherein the adaptation layer monitors the availability of MTP 3 levels at remote signalling points and reports network events to the associated MTP 3 level.
- 20 9. A method according to any one of the preceding claims, wherein the signalling point identifier comprises a Network Indicator (NI) and a Signalling Point Code (SPC), where the NI identifies a network and the SPC identifies a signalling point within that network.
- 25 10. A method according to any one of claims 1 to 8, wherein the signalling point identifier has a Network Indicator plus "Network Identifier - Network Cluster - Network Cluster Member" format.
- 30 11. Apparatus for transmitting signalling information in a telecommunications network between peer user/application parts, the apparatus comprising:
first processing means implementing a Message Transfer Part (MTP) level 3 for receiving signalling information from a first user/application part, the information including a destination signalling point identifier identifying the signalling point at which the peer user/application part is located, the MTP level 3 determining from said destination signalling point identifier, a destination address
35 suitable for conveying the signalling information to the destination signalling point or to an intermediate signalling point *en route* to the destination signalling point; and

second processing means implementing an IP part for transmitting the signalling information and the determined IP address and port number over an IP network to the destination or intermediate signalling point, in the event that said destination address is an IP address and port number.

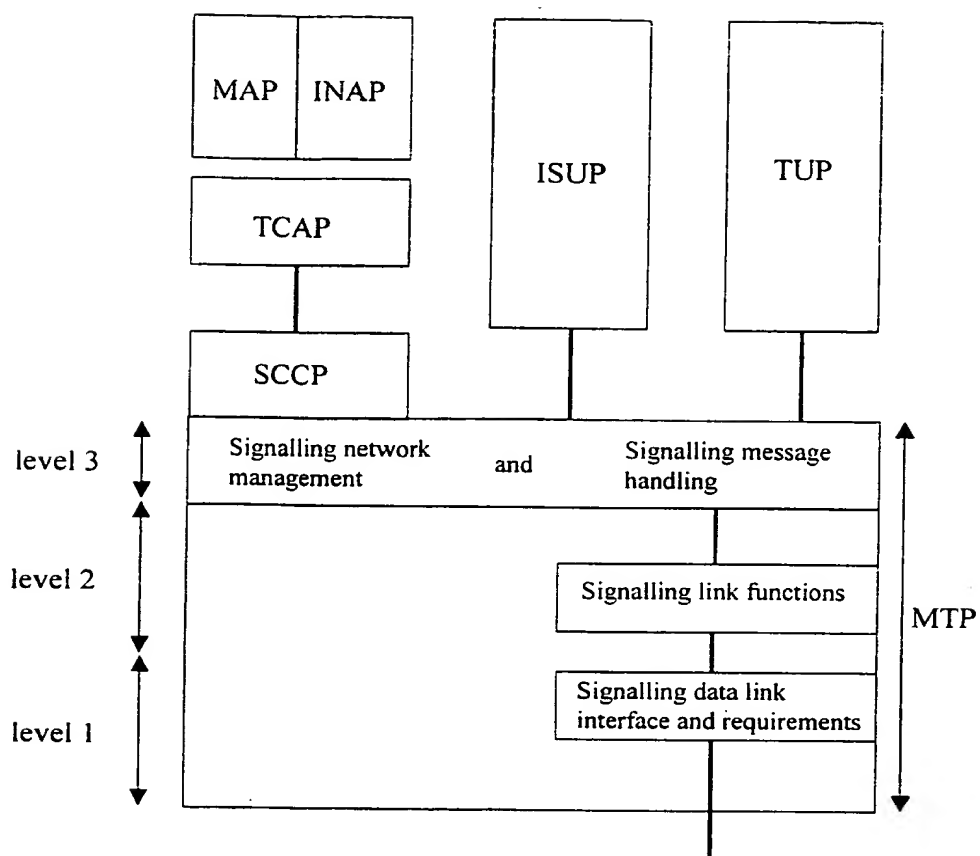


Figure 1

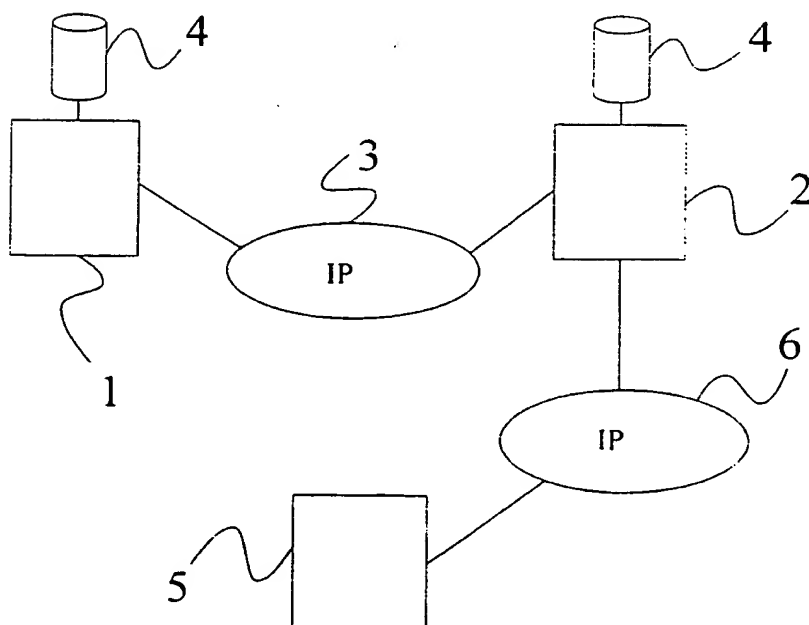
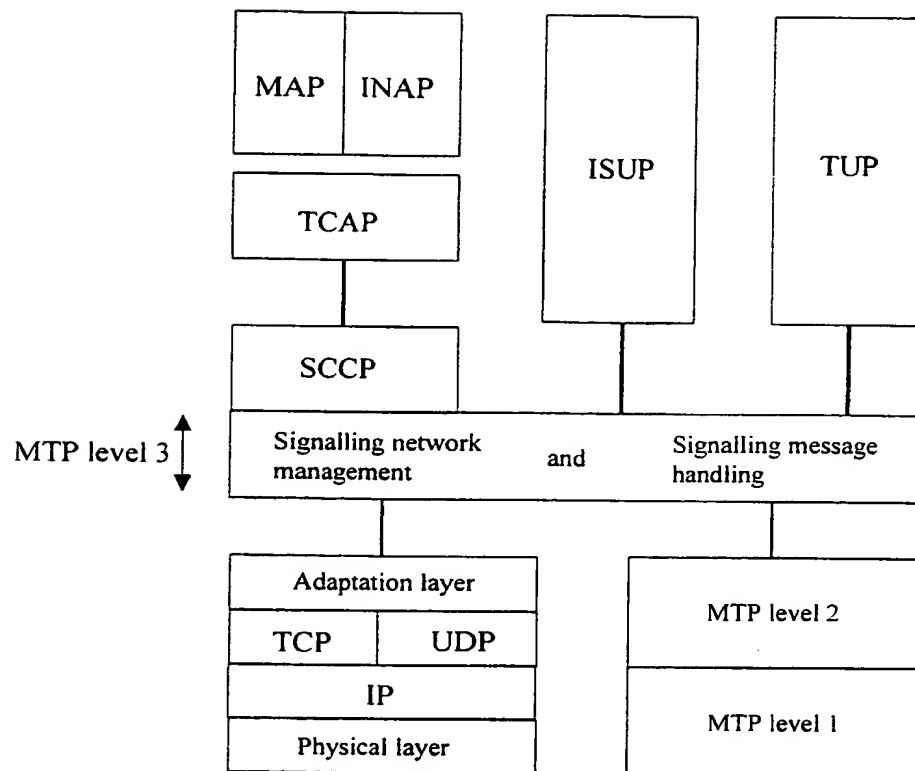
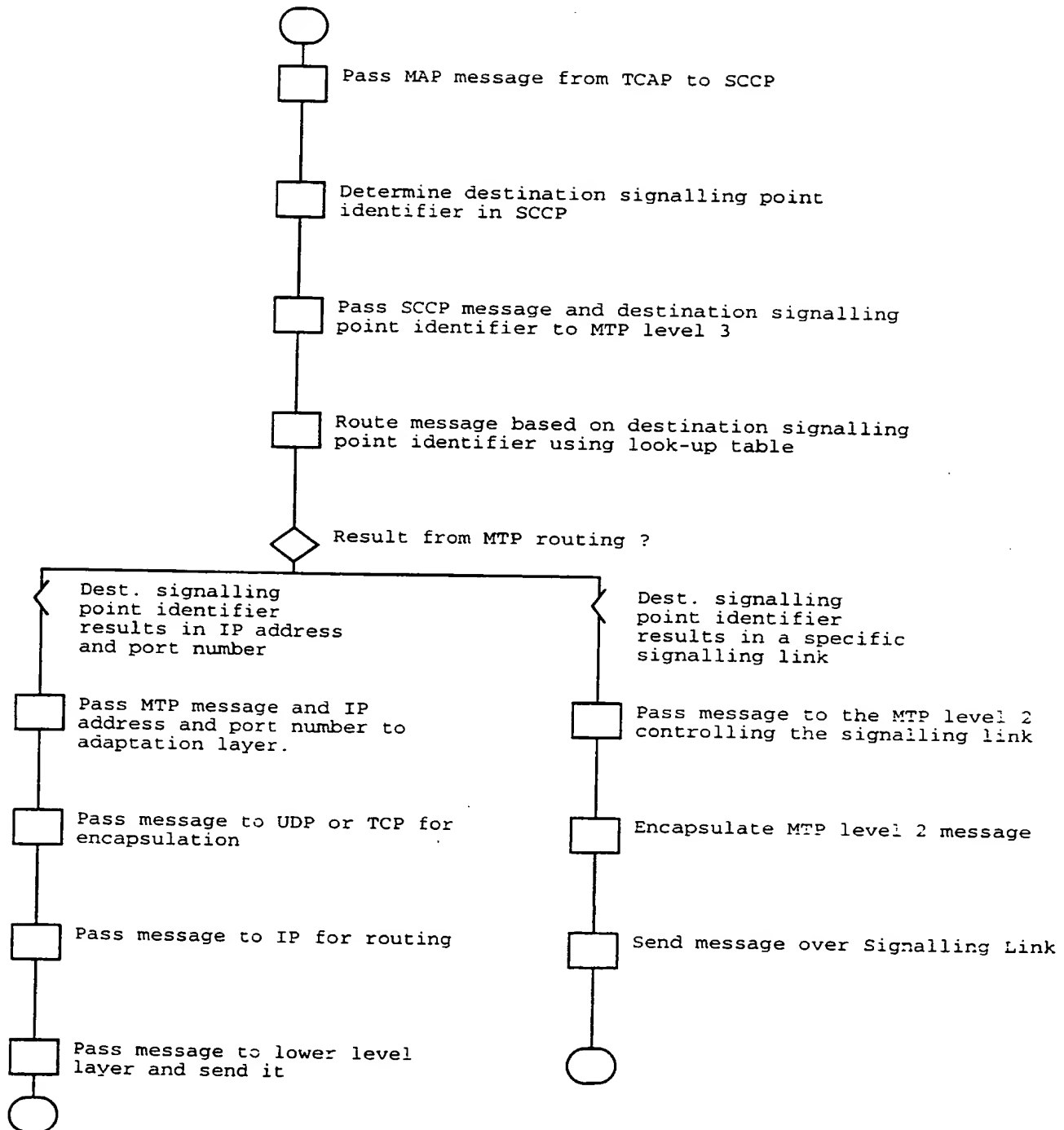
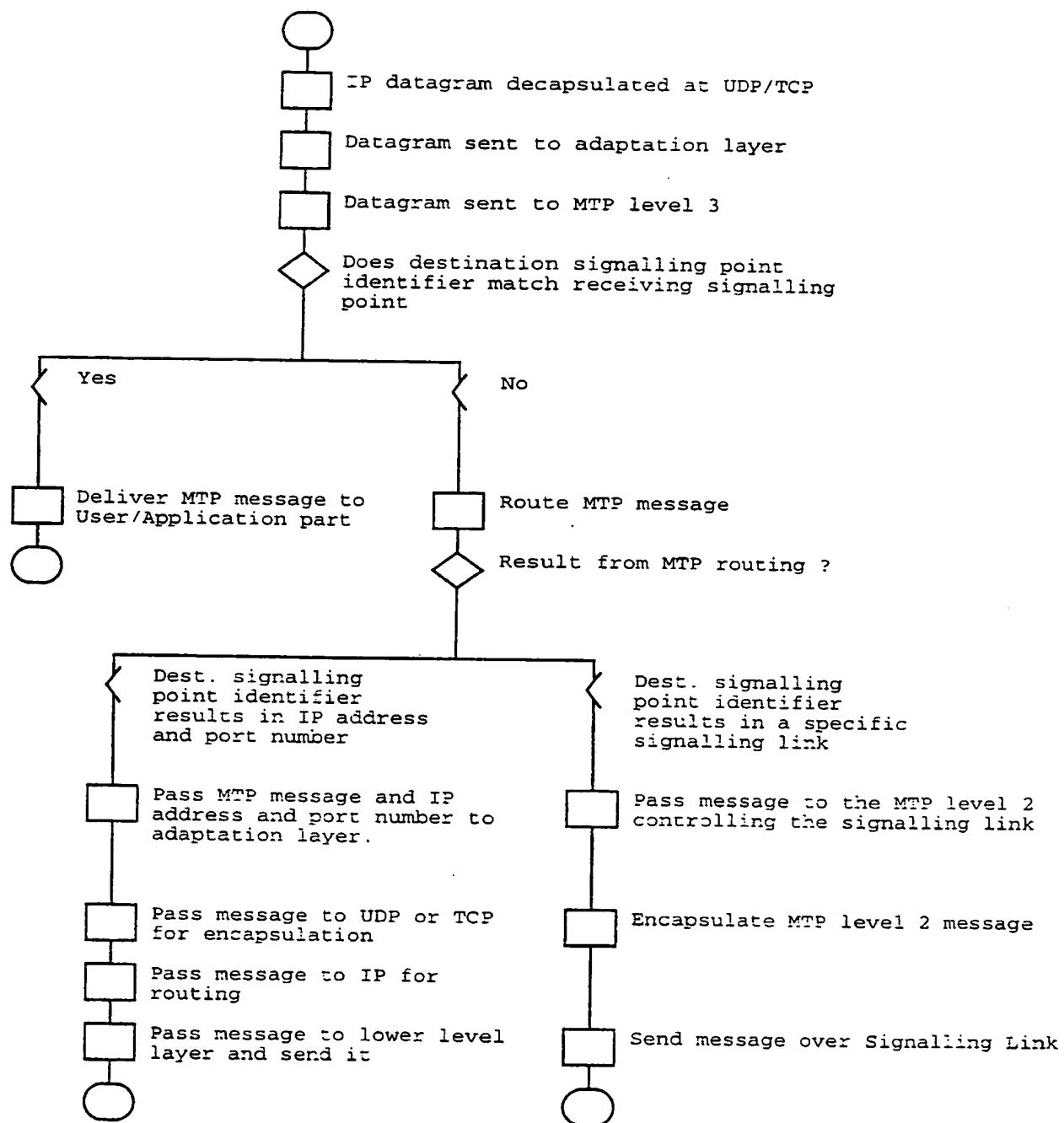


Figure 2

Figure 3

Figure 4A

Figure 4B

INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP 99/09439

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 H04Q3/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P, X	WO 99 29124 A (ERICSSON RADIO SYSTEMS AB) 10 June 1999 (1999-06-10) abstract page 2, line 23 -page 3, line 16 page 5, line 10 - line 23 page 6, line 1 - line 12	1,6,11
A	WO 97 42774 A (TELEFONAKTIEBOLAGET LM ERICSSON) 13 November 1997 (1997-11-13) abstract page 4, line 11 -page 6, line 16 -/-	1-11



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

* Special categories of cited documents :

A document defining the general state of the art which is not considered to be of particular relevance

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O document referring to an oral disclosure, use, exhibition or other means

P document published prior to the international filing date but later than the priority date claimed

T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

X document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

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Date of the actual completion of the international search

9 May 2000

Date of mailing of the international search report

19/05/2000

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INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP 99/09439

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>SEVCIK M ET AL: "CUSTOMERS IN DRIVER'S SEAT: PRIVATE INTELLIGENT NETWORK CONTROL POINT"</p> <p>PROCEEDINGS OF THE INTERNATIONAL SWITCHING SYMPOSIUM, DE, BERLIN, VDE VERLAG, vol. SYMP. 15, 1995, pages 41-44, XP000495622 ISBN: 3-8007-2093-0</p> <p>the whole document</p>	1-11

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/EP 99/09439

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WO 9742774 A	13-11-1997	US 5870565 A	09-02-1999
		AU 2795797 A	26-11-1997
		BR 9708913 A	03-08-1999